Results From Thailand's 2016 Report Card on Physical Activity for Children and Youth

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Background: Physical activity (PA) is recognized as one of the core modifiable risk factors of noncommunicable diseases. However, little is known about PA in the Thai population, particularly in children. The report card (RC) project provided Thailand with an opportunity to assess PA behaviors in children. This paper summarizes the methodology, grading process, and the final grades of the Thai RC. **Methods:** A school-based survey was conducted to collect data from a nationally representative sample of children aged 6 to 17 years. Survey results provided the primary source for the RC. Nine indicators were graded using the Global Matrix 2.0 framework. Grading was undertaken by a national committee comprising experts from key stakeholders. **Results:** Grades ranged from *F* to *B*. Overall PA and Sedentary Behaviors both received the grade *D*-. Organized Sport Participation scored a *C*. Active Play scored the grade *F*. Active Transport and support from Family and Peers were both graded *B*. School, Community, and Government indicators were scored *C*. **Conclusions:** In Thai children, participation in PA and active play is very low; conversely, sedentary behaviors are high. These first data on patterns of activity for the Thailand RC will serve to guide national actions and advocacy aimed at increasing PA in children.

Keywords: adolescent, exercise, health behavior, health promotion, intervention, policy

Physical inactivity is a global public health problem that has been identified as one of the most important behavioral risk factors leading to increased morbidity and mortality from noncommunicable diseases (NCDs).¹ It was estimated that physical inactivity accounted for 3.2 million deaths annually from NCDs.² Thailand, located in South East Asia with a population of 66 million across an area of 514,000 sq.km³, has made a significant progress in economic and social development in the past decades. Thailand became an upper-middle-income country in 2011 with a GDP per capita of USD5,816.4 and an economic growth rate of 2.5% in 2015.⁴ The country has been experiencing an epidemiological transition from communicable diseases to NCDs³ and these account for 71% of total deaths.⁵

In Thailand, physical inactivity and overweight and obesity are recognized as risk factors for NCDs. In 2009, it was estimated that 0.13 million of the 1.8 million overweight and obese children were at risk for having type II diabetes. Evidence indicates a rising trend in obesity in children from 5.8% in 1995 to 9.7% in 2009.⁶

Although childhood obesity in Thailand is lower compared with other countries, it is higher than many countries in the region and with same level of income.⁷ There are more data available on overweight and obesity,^{6,8} yet little is known about patterns of physical activity (PA), particularly in children. Some data are available from the Global School-Based Student Health Survey (GSHS), which reported that only 11.9% of students (13–17 years old) met the recommended guideline of 60 min moderate-to-vigorous PA (MVPA) daily.⁹ However, the National Health Examination Survey (NHES) disclosed a higher prevalence of PA (38.7%) in 6- to 14-year-old Thai children⁶ and an even much higher prevalence (60.7%) was reported by another national survey recently conducted in children of the same age group.¹⁰ As these prevalence estimates vary greatly they present uncertainty. It is not possible to reconcile these data, due to the use of different instruments and age groups of the samples. Of particular concern, is the inappropriate use of an adult survey instrument to assess PA in children¹⁰ and the use of untested PA questions in a wider health survey.^{6,9} Consequently, there was

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a need for new and robust data from a representative sample using age appropriate validated measures and which would allow for international comparisons.

The Thai Report Card (RC), initiated by Active Healthy Kids Canada and replicated in 2014 by 14 countries around the world, has proved to be an effective tool in stimulating policies and practices in promoting PA in children.¹¹ Participating in the Global Matrix 2.0 provides Thailand with an opportunity to benchmark the PA of Thai children to inform the development of national policy and practices. The aims of this article are to describe the method used to gather data and the process applied to assign the grade of PA and relevant indicators required for the RC, and to present the results of the first RC on PA in Thai children and youth.

Methods

Thailand Physical Activity Children Survey (TPACS) 2015

Brief information about the TPACS conducted in 2015 is described as it is an integral part of the RC development process. To collect data for TPACS, 2 new data collection instruments were developed: 1) the Student Questionnaire (TPACS-SQ); and 2) the School Principal Questionnaire (TPACS-SPQ).

The TPACS-SQ was used to collect nationally representative data on participation in PA and relevant data for the social, environmental, and policy related RC indicators among Thai children aged 6 to 17 years. The TPACS-SQ was developed by modifying and translating a previously tested instrument, the Child and Adolescent PA and Nutrition Survey (CAPANS) used in state-wide survey of Western Australian children in 2003¹² and 2008.¹³ Items collected PA participation across key domains (namely, sport, recreation, play, and travel to school), sedentary behaviors, physical education, attitudes toward PA, family and peer support, and home and community environment. Three versions of the questionnaire were developed, with the level of detail collected tailored to match the capabilities of the 3 age groups (6–9, 10–13, and 14–17 years). The total number of survey items ranged from 31 to 35. To assess whether children participated in sufficient PA, children were asked the number of days they were active for a total of at least 60 min/day over the past 7 days. To assess frequency and duration of activities in each PA domain, children in all age groups were provided with a list of activities. If they did any activities, children aged 10 to 17 years were asked further to indicate the number of times and children aged 14 to 17 years were also asked to provide the amount of time they spent in each activity. Test-retest reliability of the items measuring overall PA provided Kappa values ranging from 0.15 to 0.39 and intraclass correlation (ICC) of items measuring frequency and amount of time spent in each individual activity under each PA domain ranged from 0.34 to 0.86. Generally, the Kappa values and the ICC were stronger in older age group, compared with the younger one. Validity of the original items used in CAPANS correlated significantly ($r = .40$, $P < .001$) with accelerometer data with relatively high reliability (ICC = 0.77)¹⁴ and 38% of items measuring frequency and 27.5% of items measuring duration had acceptable ICC.¹⁵ Discrepancies in the Kappa values and the ICC between CAPANS and TPACS are likely due to necessary modifications to response scales, item ordering and wording and translation.

Student questionnaire data were collected from a representative sample of 16,788 children aged 6 to 17 years calculated based on 11.1 million students across the country.¹⁶ The study used an active

school and passive parental consent procedure. Student response rates are therefore reflected in school participation which was 84.3% of those invited. While children were provided an opportunity to decline participation in the survey, there were a negligible number of students who took this option.

A multistage stratified cluster sampling was adopted to recruit students into the study. Geographically, the country is divided into 9 regions, which are divided into 77 provinces and further divided into 878 districts.¹⁷ Firstly, all provinces within each region were stratified according to their population size. Then, in each randomly recruited province, the city district was purposively selected and another district was randomly chosen. Six schools were randomly chosen from each district giving a total of 336 schools. Students within each school were classified by sex and age and systematically recruited based on the number that was calculated proportional to size of the school.

Data collection within each school followed study protocols developed for each age group to accommodate the differences in student capability and maturity. For 6 to 9 years, student face-to-face interviews were conducted within the school class time using image cards. For both older age groups, the students completed the survey in a class format facilitated by 3 research team members and a class teacher. On completion, all surveys were collated and data entry was conducted by a trained group of research staff within each region. Data were double entered in CSPro V6.1 (U.S. Census Bureau) and manual checks undertaken to rectify discrepancies. Final datasets from each region were centrally collated by the lead author, systematically cleaned, and analysis was conducted using SPSS V22.

The School Principal Questionnaire (TPACS-SPQ) comprised 59 items assessing school policy, provision of physical and health education classes, extracurricular activities, sport facilities and equipment. The TPACS-SPQ was mailed to the participating schools with an invitation to the School Principal to complete and mail back. Nonrespondents were contacted twice as a reminder and the final response rate was 45.8% ($n = 153$).

All data collection was conducted during June 2015 to January 2016. The study protocols received ethical approval from University of Western Australia and the Institution for the Development of Human Research Protections in Thailand.

Some additional data were required for the indicator on prevalence of PA in Thai adults. This was sourced from a recent survey conducted using a representative sample.¹⁰ Government published and unpublished reports were reviewed to inform the indicator on government strategies and investment.

Indicators, Grading Assignment Process, Criteria Used to Assign Grades, and Parties Involved

For international comparison, the 9 common indicators specified by the global matrix of grades¹⁸ were included for the 2016 Thailand RC (TRC) (see Table 1). Grades were developed based on primary data collected by TPACS 2015. The grading assignment process used the grading scheme set by the Global Matrix.¹⁸ For each indicator, the data were reviewed for all ages, boys and girls, and discussed thoroughly until a consensus grade was reached.

To refine the A to F grades, specific criteria were set for adding “+” or “-” (see descriptions in Table 1). For single indicators that comprised 1 measure, data disparity in age and sex was considered for the adjustment of grades. For indicators that comprised more than 1 measure, an equal weighting was allocated to each contributing metric, unless those metrics had significant shortfalls such as data were only available to 1 age group.

Table 1 Indicators and Grades Assigned in the 2016 Thai Report Card

Indicator	Grades
1. Overall Physical Activity Levels	D-
2. Organized Sport Participation	C
3. Active Play	F
4. Sedentary Behaviors	D-
5. Active Transportation	B
6. Family and Peers	B
7. School	C
8. Community and the Built Environment	C
9. Government Strategies and Investments	C

Note. The grade for each indicator is based on the percentage of children and youth meeting a defined benchmark: A is 81% to 100%; B+ is 76% to 80%; B is 66% to 75%; B- is 61% to 65%; C+ is 56% to 60%; C is 46% to 55%; C- is 41% to 45%; D+ is 36% to 40%; D is 26% to 35%; D- is 21% to 25%; and F is 0% to 20%.

On completion of the grading process and team discussion, 1 indicator was selected as the main focus to be communicated with public in the RC. The selection was determined by considering the final grades, key target groups, implications of policy and practice within Thailand context and social values, attitudes, and culture.

The grades were assessed by the National Committee of the 2016 TRC consisting of 24 members. They were 10 academia representing 9 regions including Bangkok, 6 experts in the field, 5 representatives from Ministry of Public Health, Office of Basic Education Commission under the Ministry of Education, Ministry of Interior Affairs, Ministry of Tourism and Sports, National Statistical Office, and 3 researchers from Physical Activity Research Centre (PARC). The Committee was officially set up and authorized by Thai Health Promotion Foundation (ThaiHealth) to establish criteria to determine a grade and to assign a grade for each indicator. The lead author conducted a comprehensive literature review and led the grading assignment process with support from PARC researchers and guidance from the last 2 authors. The committee reviewed the results and supporting literature and discussed grades and grade adjustments. The committee members from government authorities additionally provided input by collating relevant documents for the government indicator. The Committee met twice in March (1 day) and April (2 days) in 2016 to accomplish their mission. On the second meeting, international experts and Leader of Global Matrix were invited to participate.

Results

Table 1 shows the 9 indicators, the metrics used for each indicator, and the final grades. Figure 1 presents the front cover of the 2016 Thai RC.

Overall PA Level: D-

TPACS 2015 revealed that only 23.2% of Thai children and youth aged 6 to 17 years met the PA guidelines of 60 min MVPA daily.¹⁹ In general, girls were less active than boys. In all age groups, a large difference in the proportion between boys and girls who met the guideline was found. The differences were 9.2%, 11.2%, and 15.2% in 6 to 9, 10 to 13, and 14 to 17 year-old groups, respectively.

Figure 1 — Front cover of the 2016 Thai Report Card on Physical Activity for Children and Youth.

The proportion of girls meeting the guidelines was <20% in 6 to 9 (19.5%) and 14 to 17 year-old groups (12.1%), except in the 10 to 13 year-old group (20.5%).

Organized Sport Participation: C

Overall, 46.6% of children aged 6 to 17 years reported participating in organized sports. Boys participated in organized sports more than girls in all age groups. The biggest difference of 12.6% in the proportion between boys and girls participating in organized was identified in 14 to 17 year-old group. Children aged 10 to 13 years participated in organized sports the most (53.1%), whereas the oldest age group (14–17 years) participated the least (42.4%).

Active Play: F

Only 9.1% of youth aged 14 to 17 years engaged in unstructured or unorganized active play >2 hrs/day. In children and youth aged 6 to 17 years, 19.9% participated in active play two or more times over the 4 free periods at school. Boys engaged in active play more than girls in all age groups in both metrics. The percentage of children engaging in active play during the free time periods decreased in older age groups. The percentage dropped from 39.1% in children aged 6 to 9 years to 14.5% in 10 to 13 years and down to 4.5% in the oldest age group.

Sedentary Behavior: *D-*

To determine the grade for this indicator, we used the Thai Ministry of Public Health's exercise guideline recommending that youth should spend ≤ 2 hrs/day watching television²⁰ which is consistent with the Canadian sedentary guideline (ie, school-aged children should spend ≤ 2 hrs/day engaging in sedentary time).²¹ Among children aged 14 to 17 years, 29.7% reported doing screen time activities (eg, watch television, and Facebook) and 32.9% reported doing sitting-down activities (eg, travel in motorized vehicles, and read cartoons) ≤ 2 hrs/day. Overall, only 21.8% of children aged 6 to 17 years spent ≤ 2 hrs engaging in sedentary behavior (eg, using the computer, and playing electronic games). The percentage of children who met the guideline decreased with age from 26.1% in the 6 to 9 year-old group to 21.8% in the 10 to 13 year-old group and 17.6% in the 14 to 17 year-old group.

Active Transportation: *B*

A high proportion of children (96.7%) aged 10 to 17 years reported using active transport to and from community facilities with a little difference in the proportion between sexes. A much lower proportion (51.2%) of children reported using active means to travel to and from school with a higher proportion of boys found in all age groups, except the 14 to 17 year-old group. The lowest proportion of 40.2% was found in 6- to 9-year-old girls who used active means to travel to from school. Results from these 2 metrics were weighted equally as travel to community facilities was considered an integral part of children daily's life.

Family and Peers: *B*

85.6% of Thai children aged 6 to 17 years indicated that their parents encouraged them to play sports or exercise. However, only 32.8% reported that their parents were physically active with them. A large proportion of children (84.9%) disclosed that they themselves encouraged their peers to be physically active. A similar proportion (85.5%) indicated that their peers in turn encouraged them to be play actively. When considering the percentage of parents who met the PA guidelines for adults,¹⁹ another study revealed that 68.1% of the Thai adults were sufficiently active.¹⁰ These metrics were given equal importance when the final grade was assigned.

School: *C*

Six metrics retrieved from the TPACS-SPQ were used to form the grade of the school indicator. The TPACS-SPQ revealed that 27.7% of the schools had policies specifically promoting PA and that 60% of physical education (PE) classes were taught by a PE specialist. No school provided their students with a total of ≥ 150 -minute PE class time/week. Most schools (93%) organized extracurricular activities outside school hours and parents were invited to these activities. However, schools indicated that 54.9% of the parents joined the activities. Almost all schools (95.9%) had their in/outdoor PA facilities and equipment available to students for use outside school hours. The grade results from multiple metrics ranging from *A* to *F* made the final grade a *C*.

Community and the Built Environment: *C*

Of the youth aged 6 to 17 years, 71.6% indicated availability of sport and exercise facilities in their community. Well over half of the youth (ranging from 53.1% to 57.4%) perceived that their community

provided them with PA facilities at good locations, in good and safe conditions, and with reasonable cost or no cost. Over half (51.1%) also perceived that their community regularly organized activities for people to be physically active, and 61.2% felt safe enough to play during the day in their neighborhood. Nevertheless, a small proportion (11.7%) of children aged 6 to 17 years reported that they played outdoor ≥ 2 hrs/day with the smallest proportion of 5.1% found in the 14- to 17-year-old girls. The results of these metrics were also weighted equally to form the final grade.

Government Strategies, Policies, and Investments: *C*

The National Committee reviewed the grading scheme set by the Global Matrix for this indicator but concluded it could not be used directly because it was difficult to determine a percentage of each measure. Instead the Committee considered current evidence from government's published and unpublished documents, policies, strategic plans, and programs promoting PA with allocated resources.²²⁻²⁵ Examples are the development of a strategic plan to promote PA in all age groups and a National Plan on Physical Activity of the Ministry of Public Health.^{26,27} Additionally, Ministry of Tourism and Sport as well as local governments have allocated budgets and resources for the implementations of sport and recreational programs including construction of infrastructures to promote children's health.^{28,29} Despite the existence of policies and availability of resources, evidence demonstrating implementations and progress of the formulated policies and intended programs including leadership and commitment of the government authorities in promoting PA particularly in the children was limited. Consequently, a moderate grade of *C* was assigned to this indicator.

Table 2 show the results on RC indicators and composite measures by age and sex.

Discussion

The final grades of the RC range from *F* to *B*. Notable disparities by sex and age were observed in the levels of participation which have significant implications to development of future interventions to promote PA among the young. The results reveal that boys participate in PA, organized sports, active transport, and outdoor play more than girls. Conversely, girls engaged in more sedentary activities than boys. Overall, as age increased, participation in PA, organized sports, and active play reduced, whereas sedentariness increased. Girls aged 14 to 17 years participated least in PA, organized sports, and active play. Biological maturity and pubertal development in advance of boys might be related to girls' lower level of PA,³⁰ although the relationship is still inconclusive.³¹ It is noteworthy to observe that boys in the oldest age group used active transport less than girls at the same age. This may reflect the fact that the use of motorcycles is popular among male teenagers in Thailand.

It is interesting to observe the pattern of grades across the 9 indicators. The grade assigned to Overall PA (*D-*), Sedentary Behavior (*D-*), and Active Play (*F*) reflects poor levels of each behavior, while in contrast, the grades given to supportive infrastructure for PA, including other influential factors, were more favorable (*C* to *B*). This pattern of grades has several implications. It suggests that the existing infrastructures, including actions from all concerned parties (ie, parents, school administrators, local authorities, and government), may be either insufficient to support active behaviors in Thai children or that other factors are modifying these behaviors.

Table 2 Percentage of Respondents Meeting Requirement of Measures

Measure of Indicators	6–9 years-old		10–13 years-old		14–17 years-old		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
1. Overall PA Levels (meeting PA guideline)	28.6	19.5	31.7	20.5	27.3	12.1	23.2
2. Organized Sport Participation	46.6	41.9	54.5	51.5	49.3	36.7	46.6
3. Active Play							
Active play during free time at school (≥ 2 time periods)	48.1	29.0	19.7	9.0	7.8	1.8	19.9
Unstructured activities (> 2 hr/day, 7 days)	N/A	N/A	N/A	N/A	10.4	8.0	9.1
4. Sedentary Behaviors							
Overall sedentary behavior (≤ 2 hrs/day, 7 days)	24.0	28.4	21.2	22.3	16.3	18.6	21.8
Screen time activities (≤ 2 hrs/day)	N/A	N/A	N/A	N/A	29.2	30.1	29.7
Sitting-down activities (≤ 2 hrs/day)	N/A	N/A	N/A	N/A	41.0	26.6	32.9
5. Active Transportation							
Active travel to school (usual means)	43.9	40.2	61.1	57.9	47.2	57.3	51.2
Active travel to community facilities	N/A	N/A	93.2	94.9	99.8	99.9	96.7
6. Family and Peers							
Parental encouragement for sports/exercise activities	86.8	85.8	88.1	88.6	82.3	81.6	85.6
Parents were active with children (≥ 1 –2 times/week)	33.5	36.2	36.2	38.9	23.6	27.2	32.8
Children encouraged friends to be active	82.8	83.5	86.6	88.1	87.4	85.1	85.5
Friends encouraged children to be active	81.0	79.7	87.1	85.7	93.2	84.6	84.9
7. School							
Having policies promoting PA							27.7
PE class taught by PE specialist							60.0
Providing PE class time ≥ 150 min/week							0.0
Offering extracurricular activities							93.0
Parents joined extracurricular activities							54.9
Providing PA facilities and equipment							95.9
8. Community and the Built Environment							
Availability of PA facilities	65.1	61.0	76.2	72.6	80.8	75.4	71.6
PA facilities were provided at good location	N/A	N/A	N/A	N/A	56.3	56.5	56.4
PA facilities were provided with good quality	N/A	N/A	N/A	N/A	54.9	55.2	55.1
PA facilities were safe to use	N/A	N/A	N/A	N/A	56.5	58.2	57.4
PA facilities provided with reasonable cost	N/A	N/A	N/A	N/A	51.0	54.8	53.1
PA activities were regularly organized	N/A	N/A	N/A	N/A	50.3	51.8	51.1
Community was safe enough to play	N/A	N/A	N/A	N/A	61.8	60.7	61.2
Children played outdoor ≥ 2 hr/day, 7 days	14.7	8.3	17.2	10.5	14.8	5.1	11.7

Abbreviations: PA, physical activity; PE, physical education; min, minutes; N/A, not available in that age group.

The pattern also implies that the grades of behavioral indicators do not necessarily correspond to the grades of social, environmental, and government indicators. This can be seen clearly in the high grade for support from family and peers (*B*). Yet despite the support, children are still sedentary and spend a great amount of time on screen devices. This indicates that family support is insufficient to secure children's participation in PA. Their involvement may depend on additional factors from other sources which are more influential, such as parents' values given to PA, and community safety in a wider context.

Environments surrounding the children, including school, community, and government policies, are important to children's PA. The moderate grades assigned to these indicators indicate that there is need for improvements, and that schools, community, and government have critical roles to play to support an increase in children's participation in physical activity. Environments in school (eg, school policy, sport facilities and equipment, and PE curricula) should be improved to raise PA level in children. Community's facilities and built environment may be provided adequately and appropriately for general community members but they might not be suitable for

children or meet the children's interests. Government policies and investments in PA do not focus on children. Current plans commonly highlight exercise and sports rather than PA. Accordingly, these physical and policy environments could partly be the reasons why PA in children is low.

In contrast to poor grades in Overall PA, Sedentary Behavior, and Active Play, 2 behavioral indicators scored promising grades (Organized Sport Participation—*C*, and Active Travel—*B*). The moderate grade in sport participation may reflect the fact that sports have been promoted for a long time and are very popular in Thailand. Before the 'physical activity' term was introduced in the country, sports were recognized as the primary form of activity to promote children's fitness and health. Active transport received a high grade but it might not reflect fully the real situations as this indicator involved several complicated issues. A lot of children using active transport to and from school might be associated with other factors, for instance socioeconomic status of parents. Further investigations will help justify factors underlining these promising grades.

The most alarming behavioral indicator was Active Play (*F*), which indicates that Thai children do not engage in sufficient energetic activities like recreational and unstructured play. However, this contrasted with the apparent high level of parental encouragement for children to play sports or exercise, which scored a grade of *C*. The low level of active play and greater engagement in structured sport and exercise may be explained by the value placed on different types of PA by Thai parents. Thai children have enormous pressure on high academic achievement and "just playing" may be viewed as less important.^{32,33} In part, the committee recognized that parental influence was high for participation in sport and exercise and raising the importance of encouraging active play by parents and opportunities for children to play calls for collective efforts to improve this indicator. The committee considered this to be a key finding from the report card process and encouraged active play to be chosen as the cover story for the 2016 TRC.

In comparison with grade results of other countries participating in the Global Matrix 1.0, Thailand as an upper-middle income country seems to follow a pattern found in some high income countries.^{18,32,34} Generally, these countries reported a high grade in infrastructures (*B*- to *A*-), a low grade in PA (*F* to *D*+) and sedentary behavior (*F* to *D*-). When compared with countries with the same level of economic development, such as South Africa and Colombia, the Thai situation on children's PA seemed to be different. When compared with many high- and low-income countries, Thailand has performed well in terms of family and peer support, but poorly in active play.¹⁸

Strengths and Limitations

There are some strengths and limitations of this present study. Regarding the strengths, the collection of new national data, using a purposively designed survey instrument, tailored to the core indicators of the Global Matrix made the Thailand approach unique. In contrast, most other participating countries developed grades on existing data and a systematic review.¹⁸ Second, the survey undertaken in a nationally representative sample across all 9 regions of Thailand including Bangkok ensured that the data and the final grading reflected the entire target population. Third, the constitution of the National Committee possessed a great variety of experts and professionals with diversified background and expertise. The variety helped ensure active involvement from all key stakeholders and that the considerations of grades were attempted in all possible

perspectives. Lastly, international expertise informed the development of instruments through to the grade assignment process and suggestions from international experts strengthened quality of the study and assessment on grades.

One limitation of this study was the use of a self-report instrument to capture PA. Recall ability, calculation ability, and item misinterpretation are potential weaknesses of the self-report instrument, especially in the youngest age group.³⁵ Children might have difficulties in recalling types and amounts of physical activities which can be largely variable.³⁶ Thus, future studies should consider included an objective measure of behaviors. Calculation ability and item misinterpretation were addressed in this study using well-trained staffs to interview children of the youngest age group to increase data validity.³⁶ Finally, the data used to inform the grade of school indicator was based on a sample of schools with only 45.8% response rate.

Recommendations

The 2016 TRC is informative and clearly shows evidence to decision makers on areas of priority in policies and practices to overcome existing challenges. The following recommendations address physical inactivity in general with an emphasis on active play as it is a priority for Thailand.

Many stakeholders at different levels can contribute to the improvement of Thailand's response to the rise in physical inactivity in children. At household level, parents should extend their supports to other domains of PA other than sports and exercise. Facilitations to children's recreational activities and permissions granted to children to play actively and freely will be likely to reduce children's sedentariness. Parents should also adjust their attitudes toward unstructured play because benefits of actively play to children are not only limited to physical health but also advanced academic performance, better social skills, and general wellbeing.^{37,38}

At school level, there is a variety of interventions that schools can implement to increase level of PA and active play in children. Schools should increase PE class time as at present schools typically offered ≤60 mins/week for PE. School should also hire a PE specialist or invite a qualified volunteer from their community to ensure quality PE class time. Exercise and sport facilities and equipment at school should be ensured that they are adequate, easily accessible, and safe to use. The facilities and equipment should not only be provided for the PE classes but also for students' self-initiated activities during free times and outside school hours. Extracurricular activities that are enjoyable and require physical movement should be created and offered to students to expand opportunities for them to be physically active. Schools should consider adding policies promoting PA and active play that are suitable in their local contexts. For example, length and frequency of recess times should be increased, if they have already existed. If not, a provision of recess times should be allotted as it is another opportunity for children to play freely and actively during daily school hours.

Outside school hours, children live in their community. Local authorities can play a critical role in encouraging children to participate more in PA by enhancing built environment surrounding the children. The authorities should explore the areas where there is no sport and exercise facility and equipment available and provide them in these areas to ensure equitable access. The facilities should be expanded to support recreational activities such as playgrounds, parks, and public open spaces. In addition, the design of currently available facilities and equipment should be adjusted to be suitable

and attractive to children. Provisions of supporting facilities such as bicycle racks, motorcycle or car parks, and change room will possibly increase the chance of the facilities being used by children and their family. Safety of the facilities and equipment is a key issue that the authorities should pay attention to because it may inhibit use of the facilities no matter how great they are. General safety (eg, from crimes, and traffics) in community also needs to be secure, if we want to encourage children to play outdoor. City development plan, such as land use, and construction of new roads and transport facilities, should include considerations on how the development can complement PA behaviors in children.

At the national level, children's PA can be raised by integrating the following recommended actions into government's on-going projects. First, the RC indicators should be integrated into the "Health Promoting School" project of Ministry of Public Health.³⁹ With a large number of schools participating in this project, the integration would rapidly promote PA concept and accelerate a translation of knowledge into practices in schools. Second, physically active play should be incorporated into the government's piloted project namely "Reduce formal class hours, Increase learning outside school hours,"⁴⁰ because it may ease implementations. Active play, which is unstructured/unorganized in its nature, can reduce concerns of parents and participating schools on what kind of activities should be provided to children and so lessening efforts of the schools in trying to fill up time with all structured activities. Finally, the national PA plan which is being developed should put a priority on the young as interventions at an early age will increase the likelihood of life-long PA at a later stage of life. Active play should be highlighted, while trying to increase PA level and lowering sedentariness. More importantly, the plan should allocate sufficient funding and resources necessary for the implementations of interventions for the young.

Further recommendations for the government to consider are also proposed. Status of PE in the national education system should be escalated and a simple concrete action is to increase the minimum time suggested for PE class in the curriculum. This intervention is influential as the curriculum is an authoritative guideline which is supposed to be followed by schools across the country. A national guideline on sedentary activities including screen time should also be established as it has implications on future programs and interventions. Effective interventions should pay attention to the data disparities in sex and age. Specific interests of children in different age groups and constraints which might have limited children (particularly girls) from being physically active should be addressed. ThaiHealth's plan to launch active play as a nation-wide campaign should involve all key stakeholders ranging from family to national level as active play is a cross-cutting issue that requires multilevel efforts.

The afore-mentioned recommendations are well supported by international scientific evidence. However, a formulation of well-informed policies, strategies, and interventions to tackle physical inactivity in Thai children should be based on local evidence. To understand more about PA and sedentary behavior in Thai children, more research is essential. Studies on correlates will be a good start at this stage to identify factors at different levels that are associated with these behaviors. Continuous surveillance is also necessary to monitor trends over time. PARC should collaborate with research institutions that regularly conduct a national surveillance study concerning children's health by adding some variables that are lagging. The collaboration might result in a rapidly increased scientific evidence for public policy decisions.

Conclusions

The 2016 TRC demonstrates that overall PA level including active play is very low and sedentary behavior is high among Thai children and youth. Thailand is generally in the same situation as some upper-middle- and high-income countries and must work hard to increase the PA level. More scientific evidences are necessary to have well-informed decisions. To improve the situation, concerted efforts from all concerned parties are needed. Despite of limited data source, the 2016 TRC serves as a baseline for future studies and an advocacy tool to drive policy and practices to improve children's health.

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